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A NEW SPECIES OF *DIDYMODON* (MUSCI) FROM CALIFORNIA

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Abstract

A new moss species, *Didymodon eckeliae* R. H. Zander, is described from San Diego County in southern California. It is distinguished from its closest relatives in *Didymodon* sect. *Vineales* mainly by scalloped and bistratose leaf margins.

The Mediterranean climate of southern California supports an assemblage of arid-adapted mosses, of which *Didymodon* is a major element (Harthill et al. 1979; Koch 1950). A member of the harsh-environment family Pottiaceae (Zander 1993), *Didymodon* in North America and Mexico (Zander 1981, 1994, 1998) is composed of a number of complexes that are uncommonly difficult to identify to species with certainty. When a distinctive new species, as is here described, is discovered, it is a matter of amazement and gratification.

Didymodon eckeliae R. H. Zander, sp. nov.

Type: USA, California, San Diego Co., 13 km NE of Lakeside, Barona [Rancheria] Indian Reservation, trunk of *Quercus agrifolia,* I. L. Wiggins, April 9, 1954 (holotype, NY, segregated as "subpacket A"). Mixed with *Grimmia pulvinata* (Hedw.) Sm. & Sowerb.

Plantae in parte distali atrovirentes. Folia caulina mucronata, longi-lanceolata, in parte distali carinata, 2–3 mm longa, late crenata, in parte folii distali ⅔–¾ in margine bistratosa, cellulis eis laminae similibus praedita; costa brevi-excurrens e cellulis irregulariter subisodiametricis vel quadratis composita; cellulae basales foliares juxta costam subdistinctae, brevi-rectangulares, 11–14 μm latae, 1–3:1; parietes cellulares basales aeque incrassati vel tenues; sinus foliares crenulationum subfragiles. Lamina in KOH rubra reagens.

Plants growing in cushions, dark green above, tan below. Stems to 1.5 cm, branching often; rounded-pentagonal in transverse section, hyalodermis absent, sclerodermis weakly developed, diameter of central cylinder cells 20–25 μm, central strand present, strong; sparsely radiculose; axillary hairs 4–5 cells in length, basal cell thicker-walled or brownish. *Cauline leaves* incurved, appressed, somewhat twisted about the stem when dry, patent to spreading-recurved when moist; *long-lanceolate, adaxial surface keeled, 2–3 mm long;* base not differentiated or short-rectangular, sheathing; margins weakly recurved in proximal ⅓–½ of leaf, *evenly and broadly crenate and bordered by 1–2 rows of bistratose cells similar to the laminal cells in distal ⅔–¾ of leaf;* apex long-acuminate; *costa short-excurrent as a mucro of quadrate or irregular nearly isodiametric cells,* adaxial cells quadrate distal to leaf base, in 4 rows, abaxial cells quadrate distal to leaf base; transverse section semicircular, adaxial epidermis present, adaxial stereid band absent, guide cells 6 (4+2) in 2 layers, hydroid strand absent, abaxial stereid band present, lunate in cross section, abaxial epidermis present, weakly differentiated; *basal cells weakly differentiated at leaf base near the costa, short-rectangular, 11–14 μm wide, 1–3:1, walls of basal cells evenly thickened to thin-walled;* distal laminal cells quadrate-hexagonal, essentially homogeneous, 7–9 μm wide, 1:1, abaxial to adaxial wall width ratio 1:1, lamina 13–15 μm thick medially, thickness ratio of multistratose to unistratose portions of leaf 2:1, papillae multiplex, poorly defined, as thick, irregular caps over the lumens, cell walls evenly thickened, convex on both sides of lamina. Specialized asexual propagation: *leaf somewhat fragile at sinuses of crenulations.* Sexual condition: apparently dioicous, archegonia alone present, terminal on stem. Sporophyte unknown. *KOH laminal color reaction red.*

The new species is named for Patricia M. Eckel in gratitude.

This is the second new species of *Didymodon* Hedwig (Pottiaceae, Musci) to be discovered recently for California, USA (Zander 1999), though the present find is from taxonomically long-neglected herbarium material. It joins the species *D. norrisii* R. H. Zander and *D. nevadensis* R. H. Zander, from Nevada (Zander et al. 1995) as new western species of the genus. Two Asian species, *D. anserinocapitatus* (X.-j. Li) R. H. Zander (Zander and Weber 1997) and *D. tectorum* (Müll. Hal.) K. Saito (Zander and Ochyra 2001) have also been discovered in the American West. Given the acute and persistent activity of bryologists in California and elsewhere in the American West, it may confidently be predicted that additional new and exotic species of Pottiaceae, if not *Didymodon,* will detected.

The new species is reminiscent of *D. sinuosus* (Mitt.) Delogne of Europe in its broadly crenulate leaf margins (notches averaging about 8–10 cells apart), but that species has distinct teeth at the apex of at least the immature leaves, and the distal leaf margins are not bistratose or only rarely so in small

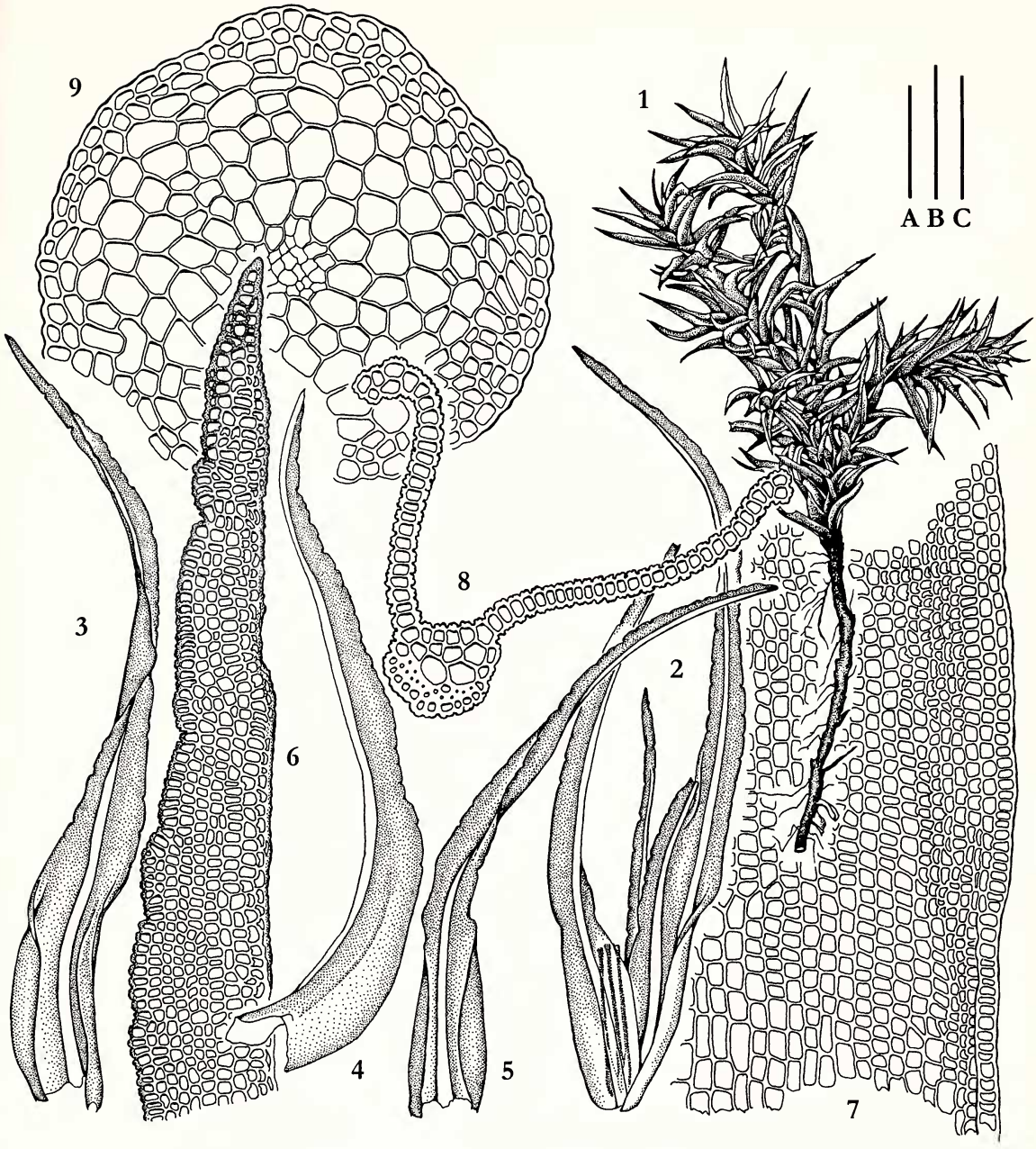

FIG. 1. *Didymodon eckeliae.* 1. Habit. 2. Perichaetium. 3–5. Cauline leaves. 6. Leaf apex. 7. Leaf base. 8. Leaf cross section at mid-leaf. 9. Stem cross section. Scale bars: A = 4 mm (fig. 1); B = 0.5 mm (figs. 3–6); C = 70 μm (figs. 6–9).

patches. There are several moss species of the American Southwest and adjacent Mexico that have bistratose leaf margins that may be confused with the new species, but none have broadly crenulate (scalloped) leaf margins. It differs, additionally, from *D. rigidulus* var. *subulatus* (E. B. Bartram) R. H. Zander by the latter's long-subulate apex, and smooth leaf cells. *Didymodon australasiae* (Hook. & Grev.) R. H. Zander has a much flattened costal section. Species of the pottiaceous genus *Mironia* R. H. Zander have strongly differentiated half-sheathing leaf bases. *Rhexophyllum subnigrum* (Mitt.) Hilp., likewise in the Pottiaceae, has deeply cleft leaf margins, but these are also dentate, and the distal portion of its leaves are bistratose in patches throughout.

The new species is closely related to *Didymodon vinealis* (Brid.) R. H. Zander, sharing such distinctive characters as weakly differentiated leaf base, transverse section of the costa at leaf base rather

concave, and the presence of a short, deep groove with the appearance of a long-elliptical window on the adaxial surface of the costa near the apex. This last distinctive feature is lacking in *D. sinuosus,* which, by its minutely crenulate leaf margins may be more closely related to *Trichostomum tenuirostre* (Hook. & Taylor) Lindb. It is similar to *D. nicholsonii* Culm. in many characters, but that also closely related species has broadly elliptical leaves with smooth margins and the costa is subpercurrent or percurrent. The common species *D. vinealis* is quite variable, and specimens with irregularly bistratose margins or unevenly notched leaves are not uncommon in California, but the combination, and regularity of the scalloping and evenness of the marginal band of bistratose cells is distinctive in the new species.

The original collection at NY was labeled only "*Trichostomopsis,*" a taxon presently recognized as *Didymodon* sect. *Asteriscium* (Müll. Hal.) R. H. Zander, probably because of the bistratose distal laminal margins and the lack of an adaxial costal stereid band. The new species, however, is immediately distinguished from species of that section by its weakly differentiated basal cells. The following key is based on that of Zander (1999).

Key to *Didymodon* sect. *Vinealis* Morphologically Similar to *D. eckeliae*

1. Leaves short- to long-lanceolate or long-triangular, to 4.0 mm, margins recurved near base or up to proximal ⅔ of leaf, propagula rare.
   2. Leaves unistratose or bistratose in very small patches marginally . . . . . *Didymodon vinealis*
   2. Leaves bistratose marginally or medially.
      3. Leaves long-lanceolate, long-acuminate, margins evenly and broadly crenulate above leaf base, bistratose in 1–2 rows . . . . . *Didymodon eckeliae*
      3. Leaves long-ovate to broadly lanceolate, apex blunt to broadly acute, margins smooth, bistratose marginally in 1–several rows in distal leaf half or occasionally only in patches . . . . . *Didymodon nicholsonii*
1. Leaves deltoid to short-lanceolate or ovate, to 1.5 or rarely to 2.0 mm, margins recurved or revolute to near apex, propagula sometimes present.
   4. Costal section showing adaxial epidermal cells thin-walled, remainder of costa thick-walled; costa blunt apically, costa wider at midleaf than below, with a bulging adaxial surface forming a long-elliptic unistratose pad of cells, guide cells in 2(–3) layers, leaf margins loosely revolute, gemmae absent or at least rare, tubers occasional on proximal rhizoids . . . . *Didymodon nevadensis*
   4. All cells of costal section about equally thickened; costa often with an apical conical cell or costa short-excurrent, costa gradually narrowing distally, adaxial surface usually nearly flat (but costa occasionally thickened and bulging adaxially), not forming a wide pad of cells, guide cells usually in 1 layer, leaf margins narrowly to loosely recurved, small spherical gemmae often present in leaf axils, rhizoidal tubers absent.
      5. Leaves ovate or ovate-lanceolate, 0.7–1.0 mm, base ovate or weakly differentiated, apex cucullate or weakly concave, margins weakly recurved, costa percurrent or very weakly excurrent from an obtuse or acute apex in 1–3 cells; lamina red in nature and with KOH, seldom green and KOH negative . . . . . *Didymodon brachyphyllus*
      5. Leaves deltoid to deltoid-lanceolate, base squared, 1.0–1.5(–2.0) mm, apex flattened, or keeled, often somewhat reflexed, margins strongly recurved to revolute, costa excurrent from an obtuse apex as a several-celled blunt mucro; lamina green in nature and with KOH . . . . . *Didymodon tectorum*

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